

**FOREST INSECT AND DISEASE
CONDITIONS IN VERMONT
CALENDAR YEAR 1983**



AGENCY OF
ENVIRONMENTAL CONSERVATION
DEPARTMENT OF FORESTS,
PARKS, AND RECREATION
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Prepared by

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DEPARTMENT OF FORESTS, PARKS AND RECREATION

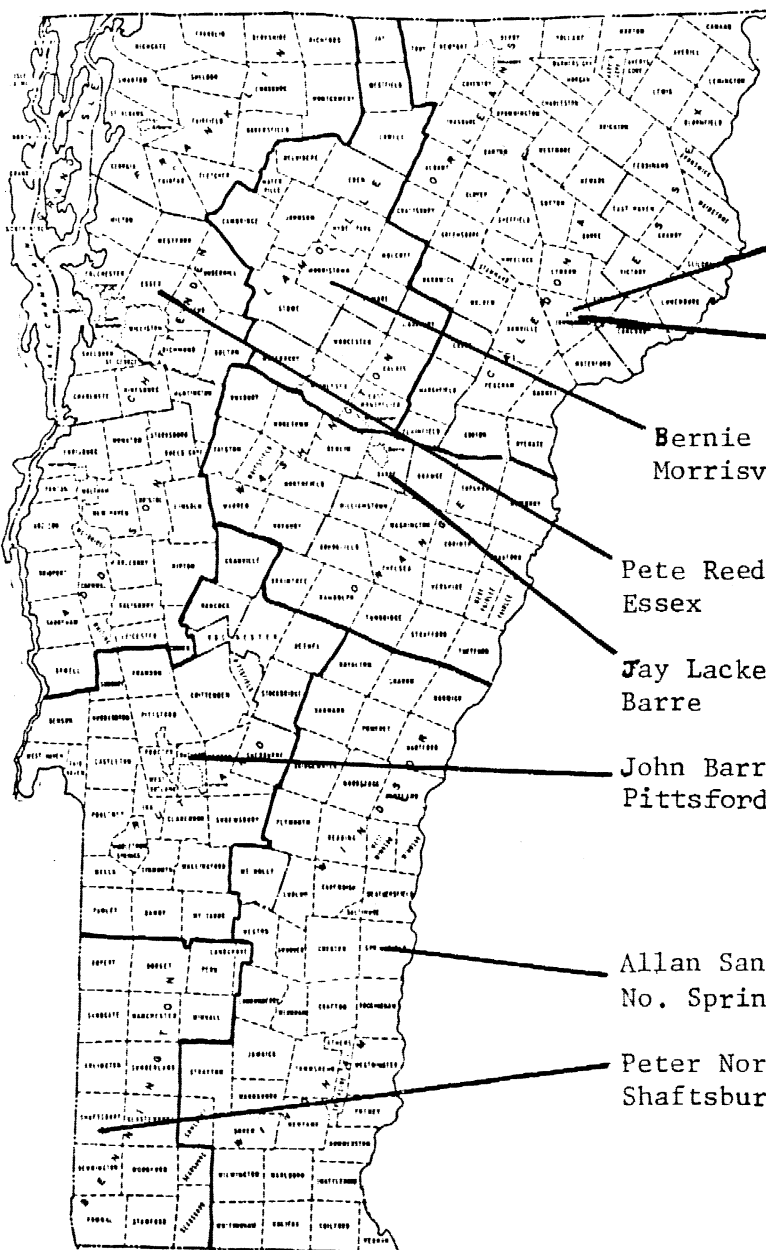
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VERMONT
INSECT AND DISEASE HIGHLIGHTS
1983

Gypsy Moth, Forest Tent Caterpillar, and Saddled Prominent populations collapsed, but tree dieback and mortality are widespread in previously defoliated stands.

Bruce Spanworm was widespread, but most damage was limited to lower crowns. One previously defoliated sugarbush was sprayed.

Maple Leaf Cutter was widespread, but heavy defoliation occurred on only 1200 acres. Two sugarbushes with persistent infestations were sprayed.

Birch Skeletonizer and Birch Leaf Folder dropped from over 38,000 acres in 1982 to approximately 1,300 acres in 1983, mostly in the Northeast Kingdom.

Spruce Budworm defoliation area infested increased from 153,852 acres in 1982 to 178,086 acres in 1983. 1,712 acres of spruce-fir were protected by aerial applications of Bacillus thuringiensis.

Scleroderris Canker was not detected in any new towns this year, but two Scots pine Christmas tree plantations within the quarantine area were found to be infected. The disease is now known to be present in 98 plantations comprising 777 acres.

White Pine Needle Blight, thought to be brought on by unusual weather conditions, caused widespread browning of current needles on individual white pine.

Frost Damage following hard frosts in mid-May caused severe shoot mortality in some areas to species with late bud break.

Dry Mid-Summer Conditions exacerbated many insect and disease related symptoms, and caused widespread scorch and chlorosis, especially at high elevations on shallow sites.

INTRODUCTION

The information in this report is based largely on aerial surveys to detect defoliation as well as ground surveys and observations of Forest Resource Protection personnel and other forestry staff. An aerial survey was flown in July to detect defoliation and mortality; an additional survey was flown over most of the State in late August to early September to detect maple leaf cutter and birch defoliation. Diagnostic assistance was provided by the University of Vermont and the U.S.D.A. Forest Service.

The winter of 1983 began with below average snowfall, and above average temperatures. March through May was cold and wet, with hard frost occurring in Mid-May. May was the wettest on record for Vermont. In June, the weather became hot and dry, and remained excessively dry through July. Rainfall in August was just in excess of 2".

Many hardwoods showed signs of stress by late summer, with leaf scorch and anthracnose, especially on maples, being very common (Map 1). Hardwoods on upper elevations and shallow soils exhibited the most off-color and dieback of many tree species was more noticeable than usual.

Mortality from previous defoliations continued to be apparent (Map 2). The unusual weather conditions resulted in a large number of fungus diseases early in the season, and widespread symptoms related to drought stress, as well as wind and ice damage.

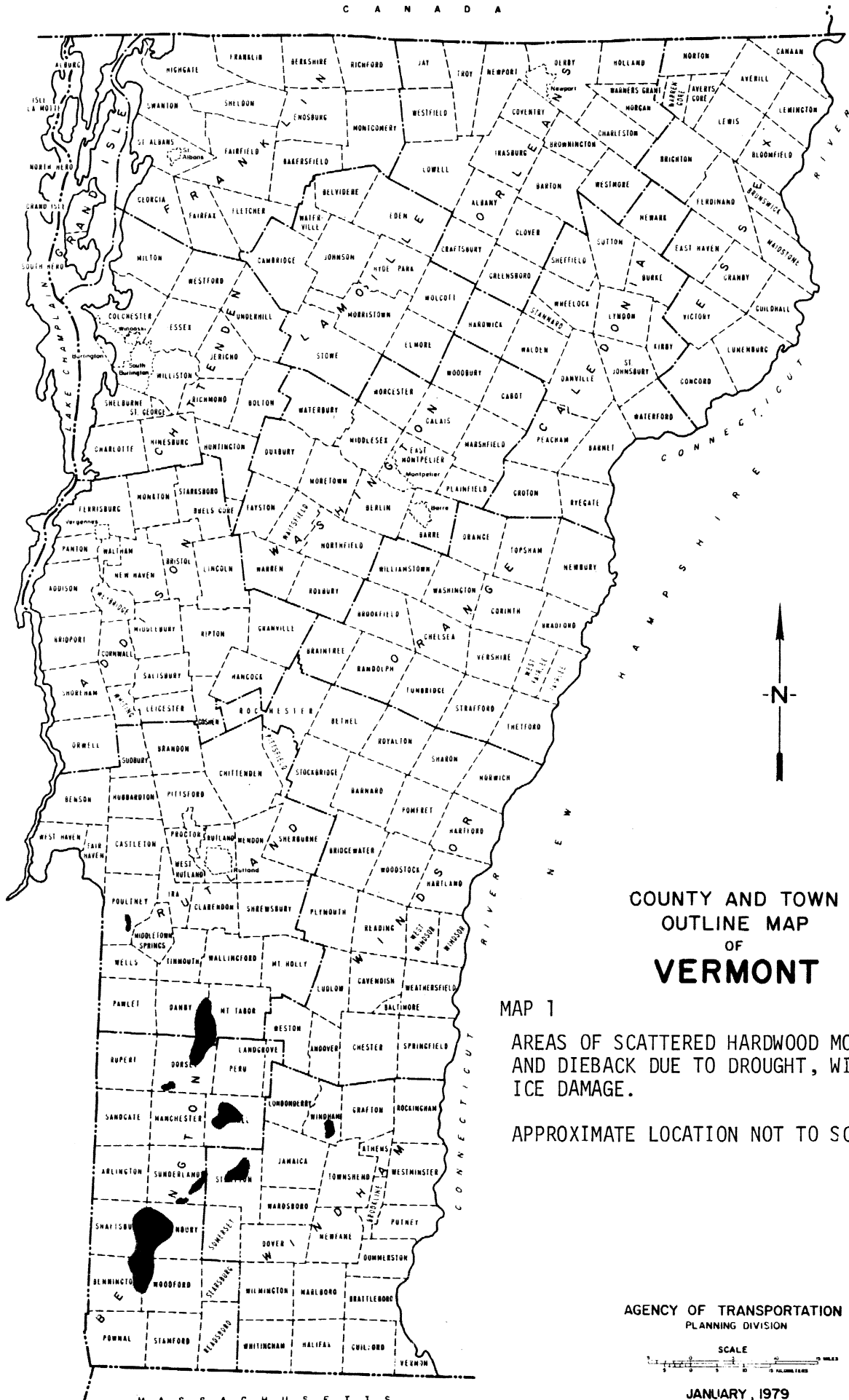
FOREST INSECTS

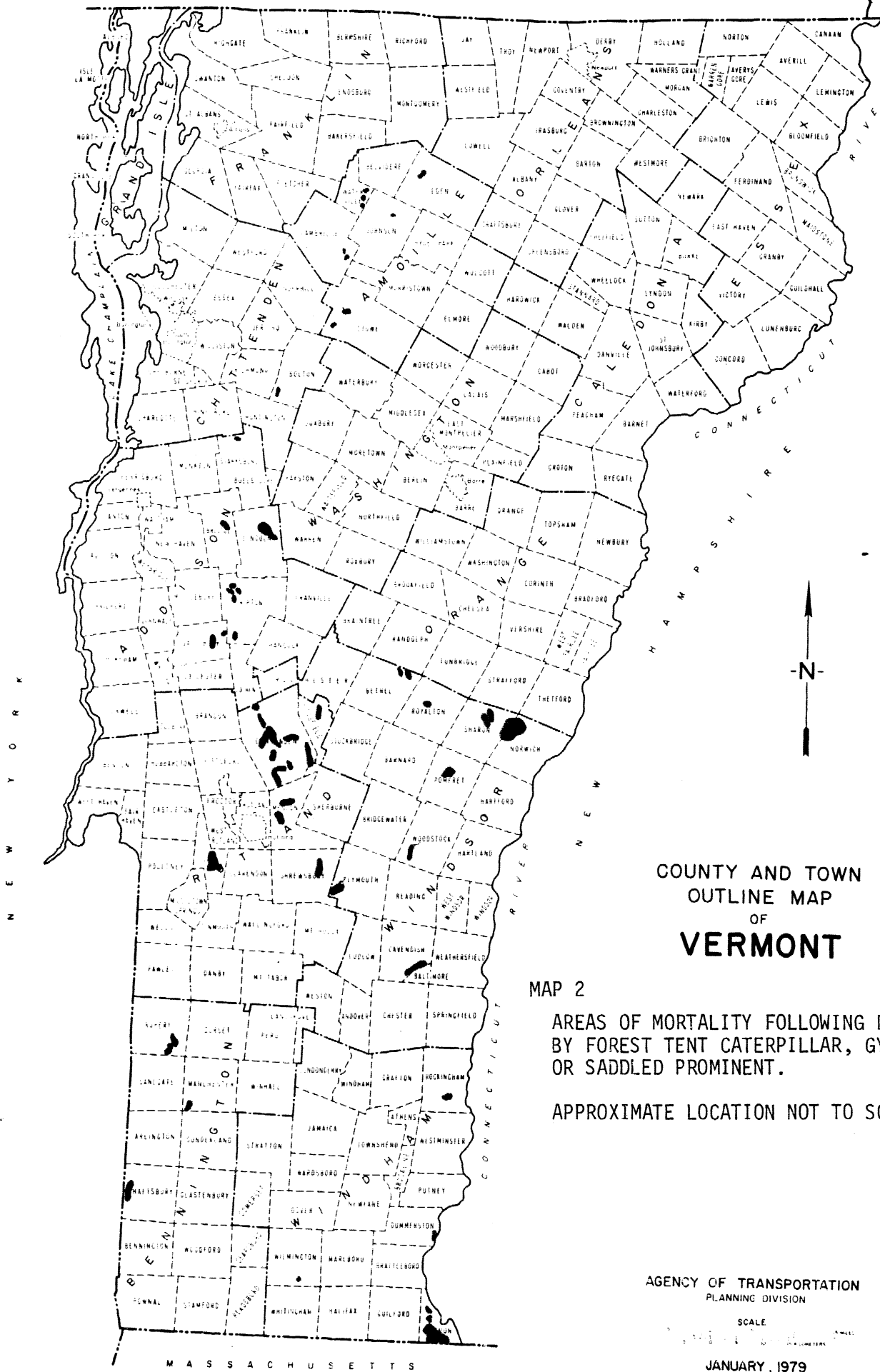
Hardwood Defoliators

Gypsy moth, Lymantria dispar, caused no noticeable defoliation this year. Occasional insects were observed, including trace populations in Bennington County. Some other areas with defoliation in 1983 looked as though they had building populations. However, they collapsed this year and no egg masses for next year could be found.

Dieback and stress were scattered in previously defoliated areas. On some poor sites, particularly with shallow soils, mortality was heavy. In one oak-northern hardwood stand in Dorset half of the basal area was dead. Generally mortality was heaviest among smaller size classes. Mortality may increase if dry conditions continue.

Forest Tent Caterpillar, Malacosoma disstria populations completely collapsed, from a peak of 322,605 acres in 1982 to only 180 acres of moderate defoliation in Orleans County aerially visible in 1983. Many areas defoliated in the past were off-color this year and similar in appearance to defoliation damage, but ground checks revealed few if any caterpillars present. Even where eggs were laid last summer, populations did not develop. In one previous outbreak area in Mendon, only one of ten new egg masses hatched this spring. The caterpillars from these eggs died before the second instar.





Areas of tree mortality are becoming more evident where forest tent caterpillars caused moderate to heavy defoliation during two or more of the previous three years. Although much of the mortality was widely scattered, and could not be easily mapped during the aerial survey, approximately five thousand acres of mortality in Rutland and Windsor Counties were mapped from the air. Mortality is heavy in about one quarter of that area.

Two years of data from plots established in 1982 in Camel's Hump State Forest indicate that partial cutting of a hardwood stand at the end of a defoliator outbreak may have a beneficial effect on residual trees. Plots were established to compare tree condition in an area that underwent a shelterwood harvest (to basal area of 50) in the winter of 1981-82 to an adjacent uncut area (basal area of 110). Both areas were heavily defoliated by forest tent caterpillar in 1980 and 81 and averaged over 30% crown dieback on plot trees, mostly sugar maple, in 1982. In September, 1983, crown condition of trees in the harvested area remained unchanged or slightly improved, while many of those in the uncut area showed an increase in dieback. This contrasts with past observations that harvests just before or during the early years of an outbreak increases the resulting amount of defoliation and dieback. Presumably, damaged trees in the harvested area are benefiting from increased light and nutrient availability, but more observations and data are needed before management recommendations can be finalized.

Saddled Prominent, *Heterocampa guttivata*, larvae were not detected at all this year, following only trace to light defoliation in 1982. Tree mortality from previous defoliations is continuing to occur with one new area observed (North Pomfret). Two of three areas in Orange County that were intensively surveyed in 1981 and 82 for extent of decline and mortality following defoliation in 1980 by saddled prominent underwent salvage harvests in 1983. Plots in Downer State Forest in Windsor County, and the third in Orange County were evaluated again this year (Table 1). Observations in these areas as well as uncut portions of the Chelsea area indicate that mortality will taper off. Most trees that are not now dead or dying are beginning to improve in terms of foliage quality and abundance. Most trees that retained at least 60 percent of their original crowns are still alive, and though defect due to dead tops is likely to be substantial, they are providing some shelter to the developing understory. Sugar maples and some white ash in these stands are now beginning to outgrow the Rubus, striped maple, and pin cherry.

TABLE 1 TREE CONDITION FROM 1981-83 FOLLOWING HEAVY DEFOLIATION BY SADDLED PROMINENT

Town	Site Quality for Northern Hardwoods	Percent of Trees					
		Dying 1981	Dead 1981	Dying 1982	Dead 1982	Dying 1983	Dead 1983
Sharon	Good	33	9	39	12	12	42
Vershire	Good	63	9	--	32*	18	50

*Estimated in 1983

Bruce Spanworm, Operophtera bruceata, a hardwood defoliator (Figure 1) that caused light to moderate understory damage in 1982 was even heavier and more widespread this year, but most damage was limited to the understory and lower crowns of the overstory trees. Despite the fact that aerial detection of this pest was not possible, 30,000 acres of light to moderate defoliation are estimated from ground observations. This should be considered an underestimate of the total acres infested. Limited survey data from northern Vermont (Table 2) shows that the heaviest damage was in the Northeast Kingdom.



Figure 1 Bruce spanworm larva (center) and typical pattern of defoliation on sugar maples.

TABLE 2 1983 BRUCE SPANWORM DEFOLIATION

County	Towns Affected	Acres of Light to Moderate Defoliation
Caledonia	Groton	10,050
Essex	Victory	5,000
Orange	Washington, Vershire	50
Orleans	Barton, Greensboro, Glover, Irasburg, Westmore	5,500
Washington	Cabot	260
TOTAL		20,860

Heavy spanworm defoliation of sugar maple that began to show up in the understory of numerous sugarbushes in early June had sugar-makers concerned, but the insect completed its life cycle in most stands without much damage to dominant trees.

One sugarbush in South Woodstock which had been defoliated in 1982 was sprayed in late May with Sevin 80S. Dieback was already present in the stand because of prior defoliation by saddled prominent. The insecticide reduced caterpillar density from 4 per ten leaf clusters to 0.5 per ten clusters. Egg density was sampled in this sugarbush in late April. All eggs on woody vegetation between 3½ and 4½ feet from the ground were counted. Strips ten feet wide and one chain long were the sample units. On six strips, numbers ranged from 0 to 60 eggs. The average per strip was 18. Eggs were found singly or in small groups.

Maple Leaf Cutter, Paraclemensia acerifoliella, remains widespread. Although it is increasing in scattered locations, most of the damage is light or restricted to the understory and lower portions of sugar maple crowns so that it cannot be aerially detected. Approximately 1200 acres in Washington County and other widely scattered towns had moderate to heavy defoliation compared to nearly 14,000 acres in 1982.

Two sugarbushes with persistent infestations were sprayed with Sevin 80S, with good results. One was a 13 acre sugarbush in Brain-tree, sprayed on July 16. A sticker was added to the pesticide mix when spraying this stand. The 30 acre sugarbush in Pownal was sprayed on July 7. Dieback was already occurring in this stand, and pre-spray samples showed over 7 mines per leaf.

Birch Skeletonizer, Bucculatrix canadensisella, and Birch Leaf Folder, Ancylis discigerana, responsible for over 38,000 acres of defoliation in 1982, dropped to light population levels that were mapped on only 1,272 acres, mostly in the Northeast Kingdom (Table 3). Browning of birch foliage was widespread in southern Vermont. Most of the damage is attributed to dry conditions, as insect levels have declined. Birch Skeletonizer was the predominant insect present on yellow and white birches receiving late defoliation this year.

TABLE 3 1983 BIRCH SKELETONIZER-BIRCH LEAF FOLDER DEFOLIATION

County	Towns Affected	Acres of Light Defoliation
Caledonia	Peacham	264
Essex	East Haven, Norton	527
Orleans	Newport	62
Washington	Calais, E. Montpelier, Marshfield	419
TOTAL		1272

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Birch Leaf Miner <u>Fenusa pusilla</u>	White Birch Grey Birch	Widespread	Lighter in north than 1982. Heavy damage from second generation in south due to dry conditions.
Birch Tube Maker <u>Acrobasis betulella</u>	White Birch	Springfield	Ornamentals
Cherry Scallop Shell Moth <u>Hydria prunivorata</u>	Cherry	Southeastern Vermont	Scattered
Dagger Moth <u>Acronicta</u> sp.	Elm	Swanton	
Eastern Tent Caterpillar <u>Malacosoma americanum</u>	Cherry Apple	Northern Vt.	Scattered, causing occasional damage; lighter than 1982.
Elm Leaf Beetle <u>Pyrrhalta luteola</u>	Elm	Widespread	Light to moderate defoliation in scattered locations.
Fall Cankerworm <u>Alsophila pometaria</u>			Not observed.
Fall Webworm <u>Hyphantrea cunea</u>	Oak	Chester	
Gouty Vein Gall Midge <u>Dasineura communis</u>	Sugar Maple	Norwich	Ornamentals
Green Fruitworm <u>Lithophane antennata</u>			Not observed.
Green Striped Mapleworm <u>Anisota rubicunda</u>			Not observed.
Half Winged Geometer <u>Phigalia titea</u>			Not observed.
Imported Willow Leaf Beetle <u>Plagiodera versicolora</u>	Willow	Windham Co.	

HARDWOOD DEFOLIATORS (Cont.)

INSECT	HOST(S)	LOCALITY	REMARKS
Large Aspen Tortrix <u>Choristoneura conflictana</u>			Not observed
Linden Looper <u>Erranis titiaria</u>			Not observed
Locust Leaf Miner <u>Odontata dorsalis</u>	Black Locust	Widespread	Scattered, but increasing in Windham County.
Maple Petiole Borer <u>Caulocampus acericaulis</u>			Not observed.
Maple Trumpet Skeletonizer <u>Epinotia aceriella</u>	Sugar Maple	Widespread	Light defoliation only in scattered locations.
Maple Webworm <u>Tetralopha asperatella</u>	Sugar Maple	Northern Vt.	Observed occasionally, less common than in 1982.
Mountain Ash Sawfly <u>Pristophora geniculata</u>	Mountain Ash	Widespread	Scattered heavy defoliation in north; reduced damage in south.
Oak Leaf-tier Complex <u>Psilicorsis reflexella</u> <u>Tetralopha sp.</u> <u>Telphusa quercinigraciella</u> <u>Morrisonia confusa</u>	Oak	Middlesex, Waterbury	Levels dropped to very light from light to moderate in 1982.
Orange Humped Mapleworm <u>Symmerista leucytis</u>			Not observed.
Pear Sawfly <u>Caliroa cerasi</u>			Not observed.
Satin Moth <u>Leucoma salicis</u>	Poplar	Essex	Ornamental
Solitary Leaf Roller <u>Sparganothis pettitana</u>	Sugar Maple	Northern Vt.	Observed occasionally; down from previous years.
Spiny Elm Caterpillar <u>Nymphalis antiopa</u>			Not observed

HARDWOOD DEFOLIATORS (CONT.)

INSECT	HOST(S)	LOCALITY	REMARKS
Spring Cankerworm <u>Paleacrita vernata</u>			Not observed.
Uglynest Caterpillar	Cherry	Rutland & Lamoille Cos.	Only young colonies in Lamoille Co., one nest in Ira.

Softwood Defoliators

Spruce Budworm, Choristoneura fumiferana (Figure 2) defoliation damage as determined by aerial survey increased from 153,852 acres in 1982 to 178,086 acres in 1983 (Map 3, Table 4).

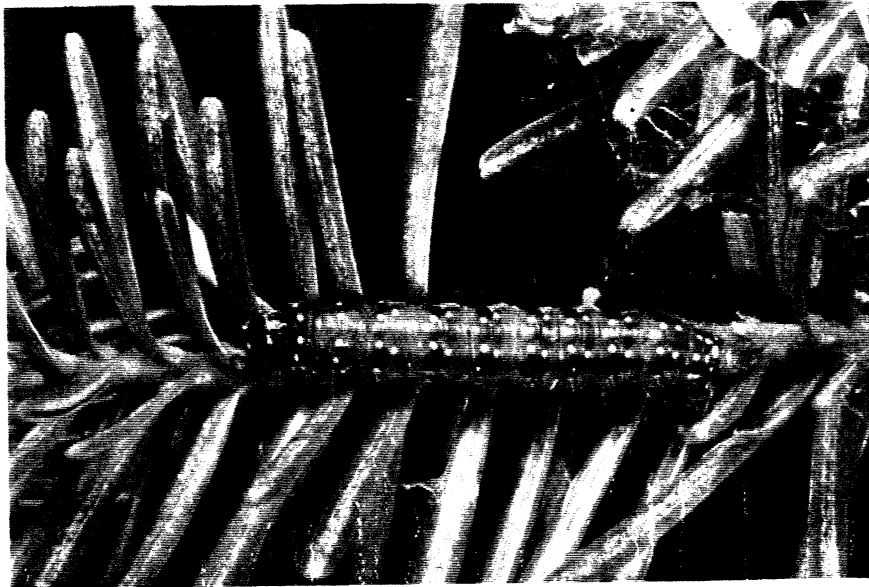


Figure 2 Spruce budworm larva.

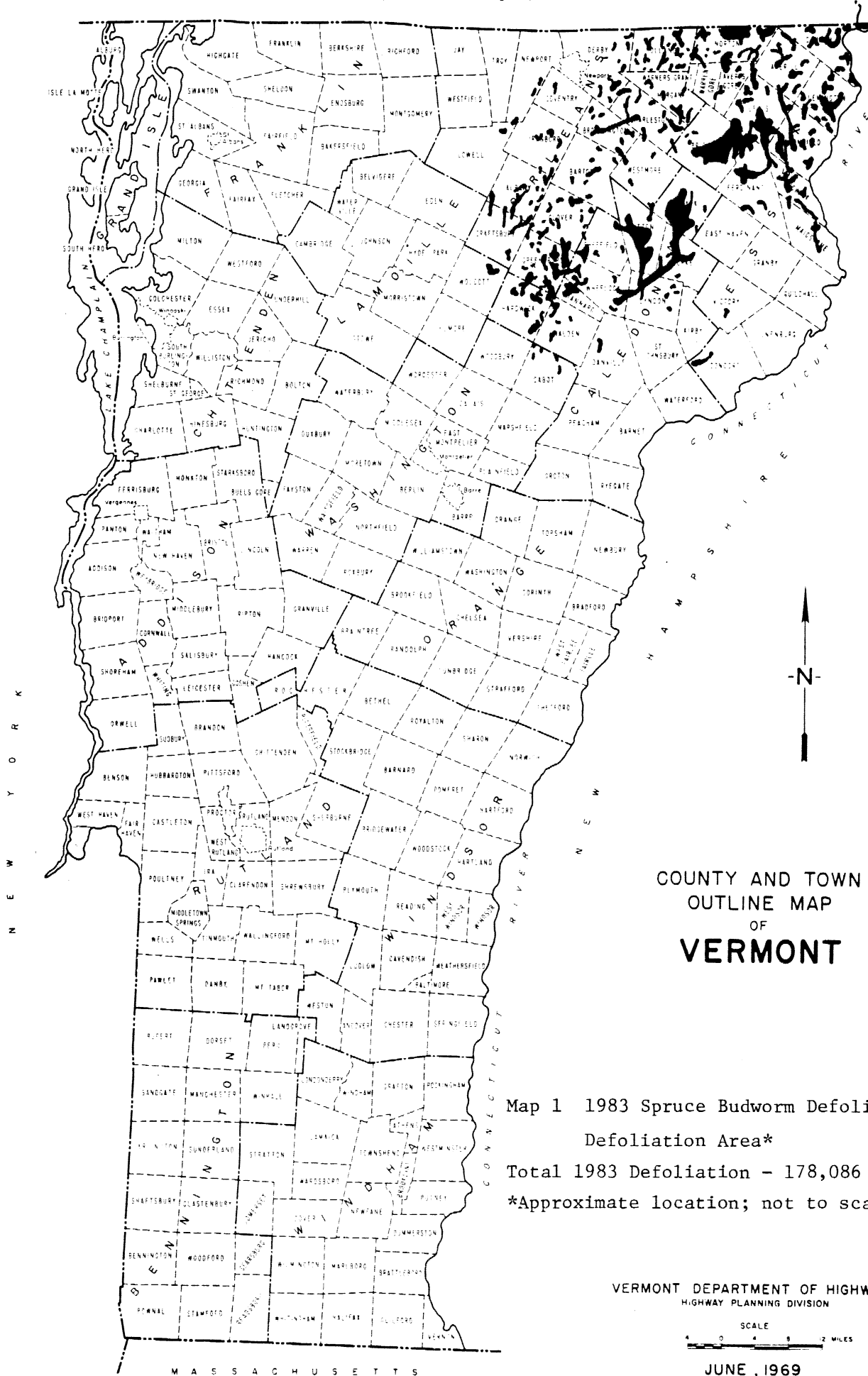


TABLE 4 1983 SPRUCE BUDWORM DEFOLIATION

County	Light ²	Acres Defoliated ¹		Total
		Moderate	Heavy	
Caledonia	10,313	8,173	23,254	41,740
Essex	32,713	10,299	21,864	64,876
Lamoille	1,100	349	194	1,643
Orleans	17,234	15,313	35,359	67,906
Washington	1,921	0	0	1,921
TOTAL	63,281	34,134	80,671	178,086

¹ Light defoliation = yellow to light brown tops present.

Moderate defoliation = red to brown color of top 50% or less of the crown on most trees.

Heavy defoliation = red to brown color of over 50% of the crown on most trees. Stand brown.

² Includes 36,552 acres estimated from ground checks, but not visible from the air.

Ground surveys indicate that actual defoliation in most locations was somewhat lighter than in 1982, possibly due to the cool, wet spring. Dead larvae were also very common during surveys of last instar larvae and pupae in unsprayed areas. An analysis of defoliation of individual branch samples from 50 locations scattered throughout the infested area shows that defoliation damage decreased in 65 percent of the plots, stayed the same in 10 percent and increased in 25 percent. Any decrease was probably masked by years of past defoliation damage when stands were broadly classified by the 1983 aerial survey.

A survey of the number of overwintering larvae is in progress with data from nearly half of these plots presently analyzed. This data shows a definite downward trend in population numbers for 1984 compared to 1983. This downward trend is expected to be only temporary and probably reflects an increase in larval mortality this year due to the cool, wet spring. Other states and provinces in the northeast are predicting similar population decreases for next year.

Many spruce-fir stands appear to be shifting from the light and moderate to moderate to heavy categories, with a corresponding increase in acres exhibiting tree mortality (Table 5).

TABLE 5 ACRES OF MORTALITY IN 1983 DUE TO SPRUCE BUDWORM

County	Light	Acres of Mortality ¹		Total
		Moderate	Heavy	
Caledonia	8,173	17,440	5,814	31,427
Essex	10,229	16,398	5,466	32,093
Lamoille	0	44	150	194
Orleans	15,313	26,519	8,840	50,672
Washington	0	0	0	0
TOTAL	33,715	60,401	20,270	114,386

¹ Light mortality = 1-10% scattered or patchy.

Moderate mortality = 10-25%, scattered.

Heavy mortality = over 25%.

Budworm-caused mortality of fir and spruce that occurred during the past year was estimated from a survey of 11 stands in the Northeast Kingdom in October, 1983. Over 100 fir and spruce trees over 4.5 inches DBH per stand were rated as dead within the past year, dead more than one year, dying or living, for five stands with heavy mortality, three stands with moderate mortality and three stands with light mortality. Sixteen, 8.6 and 3.6 percent of the original number of fir and spruce trees (almost entirely fir) had died during the past year, respectively, within stands of heavy, moderate and light mortality. These percentages were applied to average per acre volume and density data derived from the 1980 Orleans County Spruce Budworm Mortality Survey to produce the following loss estimates.

TABLE 6 ESTIMATED TREE MORTALITY IN 1983 DUE TO SPRUCE BUDWORM¹

County	No. of Trees Dead	Total Volume Lost (cords)
Caledonia	870,000	65,369
Essex	888,000	66,754
Lamoille	5,000	404
Orleans	1,403,000	105,398
TOTAL	3,166,000	237,925

¹ Losses primarily of fir that occurred between October 1982 and October 1983, using a conversion factor of 80 cu. ft. per cord.

If one assumes a timber value of 10 dollars per cord, then the total wood value of this annual loss is 2.4 million dollars. This does not account for losses due to damage to valuable deer wintering areas or aesthetic losses.

A suppression project was conducted this year in an effort to provide some relief to owners of spruce-fir woodlots threatened with impending or increased losses due to budworm-caused tree mortality (Figures 3 & 4). Project costs of \$14.00 per acre were shared with the State (25%) and federal (75%) governments so that landowner cost was only \$3.50 per acre. A total of 1712 acres in Orleans and Caledonia counties were sprayed with the bacterium Bacillus thuringiensis (B.t.) Three formulations of B.t. - Thuricide 32 LV, Bactospeine FC, and Dipel 6L were applied to 18, 8 and 6 blocks, respectively, totaling 640, 659 and 413 acres. The formulations were each applied at 12 BLU per acre mixed with water to a total volume of 3 quarts per acre, using a small fixed-wing aircraft. The plane operated out of Caledonia airport on June 1-3.

The goal of the suppression project to save at least 40% of current foliage (keep defoliation below 60%) was achieved, with virtually no difference in efficacy between the three formulations. Percent defoliation after budworm had stopped feeding averaged 38% for the sprayed stands compared to 59% for 3 untreated stands that were monitored.

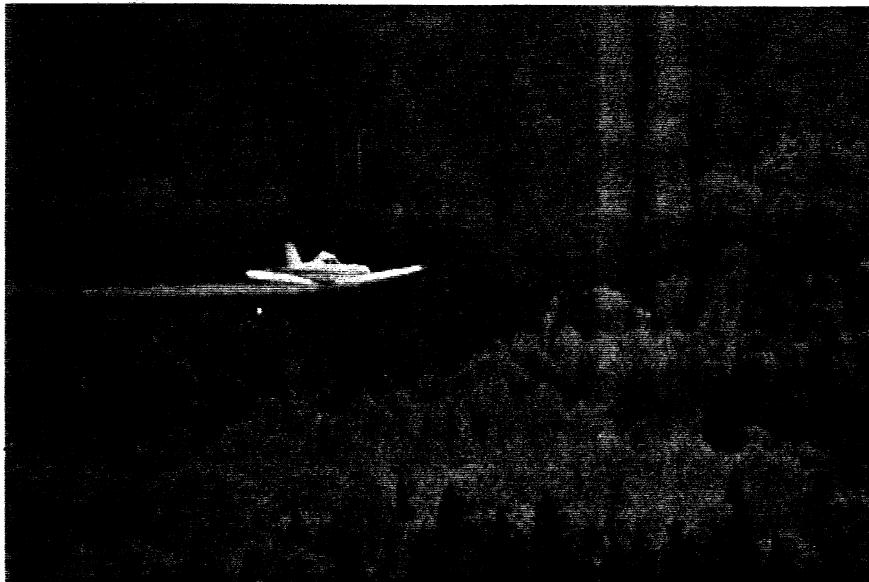


Figure 3 Aerial spraying to control spruce budworm. Note the white balloon corner-marker just below the plane.



Figure 4 Spray plane and airport operations at Caledonia airport.

An additional 300 acres within the Calendar Brook Deer Wintering Area in Sutton, managed by the Vermont Fish and Game Department, were experimentally sprayed June 3rd with Bactospeine 72 BIU. This was applied at 12 BIU per acre and 1 and 2 quarts of total volume per acre under the direction of University of Vermont entomologist Dr. Bruce Parker. His data showed no differences between sprayed and unsprayed areas in terms of defoliation or larval reduction.

Since spraying is recognized as only a short-term solution to the budworm problem, the department seeks to improve the marketing and use opportunities for spruce-fir, including dead material and promote forest management practices to reduce present and future losses. To that end, a Spruce Budworm Demonstration Project was initiated in 1983, with Sam Hudson as Project Forester. This project is designed to provide advanced training and accelerate monitoring and evaluation, utilization, landowner assistance and management within nine towns comprising 130,000 acres in the counties of Caledonia, Lamoille and Orleans.

Spruce budworm has not been observed in southern Vermont. Four pheromone-baited delta traps were set out in the Ludlow-Shrewsbury area. Sites included a mountain-top, upper slope fir-hardwood transition forest, and spruce-fir flats. The traps were set in early August, at the tail end of the normal flight period. No budworm adults were caught.

OTHER SOFTWOOD DEFOLIATORS

<u>INSECT</u>	<u>HOST(S)</u>	<u>LOCALITY</u>	<u>REMARKS</u>
Arborvitae Leaf Miner <u>Argyresthia thuiella</u>	Arborvitae	Widespread	Light damage only.
Introduced Pine Sawfly <u>Diprion similis</u>			Not observed.
Larch Casebearer <u>Coleophora laricella</u>	Larch Tamarack	Southern Vt.	Increasing, defoliation observed in Windham Co.
Larch Sawfly <u>Pristophora erichsonii</u>			Not observed.
Red-headed Pine Sawfly <u>Neodiprion lecontei</u>	Red Pine	Franklin Co.	Roadside trees.
Spruce Bud Moth <u>Zeiraphera canadensis</u>	White Spruce	No. Vermont	Abundant in Northeast Kingdom, but damage is light. Often confused with spruce budworm.

OTHER SAPSUCKING INSECTS, MIDGES AND MITES (CONT'D)

PEST	HOST(S)	LOCALITY	REMARKS
Balsam Woolly Aphid <u>Adelges piceae</u>	Balsam fir	Caldeonia Co.	No recent mortality reported.
Cooley Spruce Gall Aphid <u>Adelges cooleyi</u>			Not observed.
Eastern Spruce Gall Aphid <u>Adelges abietis</u>	Spruce	Widespread	New galls less numerous than recent years in Lamoille County.
Hickory Gall Aphid <u>Phylloxera caryaecaulis</u>			Not observed.
Oystershell Scale <u>Lepidosaphes ulmi</u>			Not observed.
Pine Bark Aphid <u>Pineus strobi</u>	White Pine	Widespread	Populations lighter than 1982. Causing mortality to recent Christmas tree transplants in Springfield.
Pine Needle Scale <u>Chionopsis pinifoliae</u>	Mugho Pine	No. Vermont	Scattered heavy damage.
Pine Spittlebug <u>Aphrophora parallela</u>	Scots Pine	Danville	Abundant on Christmas tree
Root Aphid <u>Prociphilus americanus</u>	Balsam Fir Fraser Fir	Wolcott	Soil drench was used to reduce damage in a Christmas tree transplant bed.
Pine Thrips <u>Gnophothrips</u> sp.	Scots Pine	Mt. Holly	Caused needle distortion, stunting and swelling. Damage exacerbated by poor pruning and weed control.

FOREST DISEASES

Stem Diseases

Scleroderris Canker, caused by Gremmeniella abietina was not found in any new towns this year and the quarantine area remains the same as in 1981 and 82 (Map 4). This year, 50 pine Christmas tree plantations in 28 towns were inspected within the quarantine area and two plantations were found to be infested with the disease. Trees removed from these plantations can be sold only within the quarantine area. Another 75 pine plantations totaling about 200 acres were surveyed in 23 towns bordering the existing quarantine zone. None of these were found to be infected.

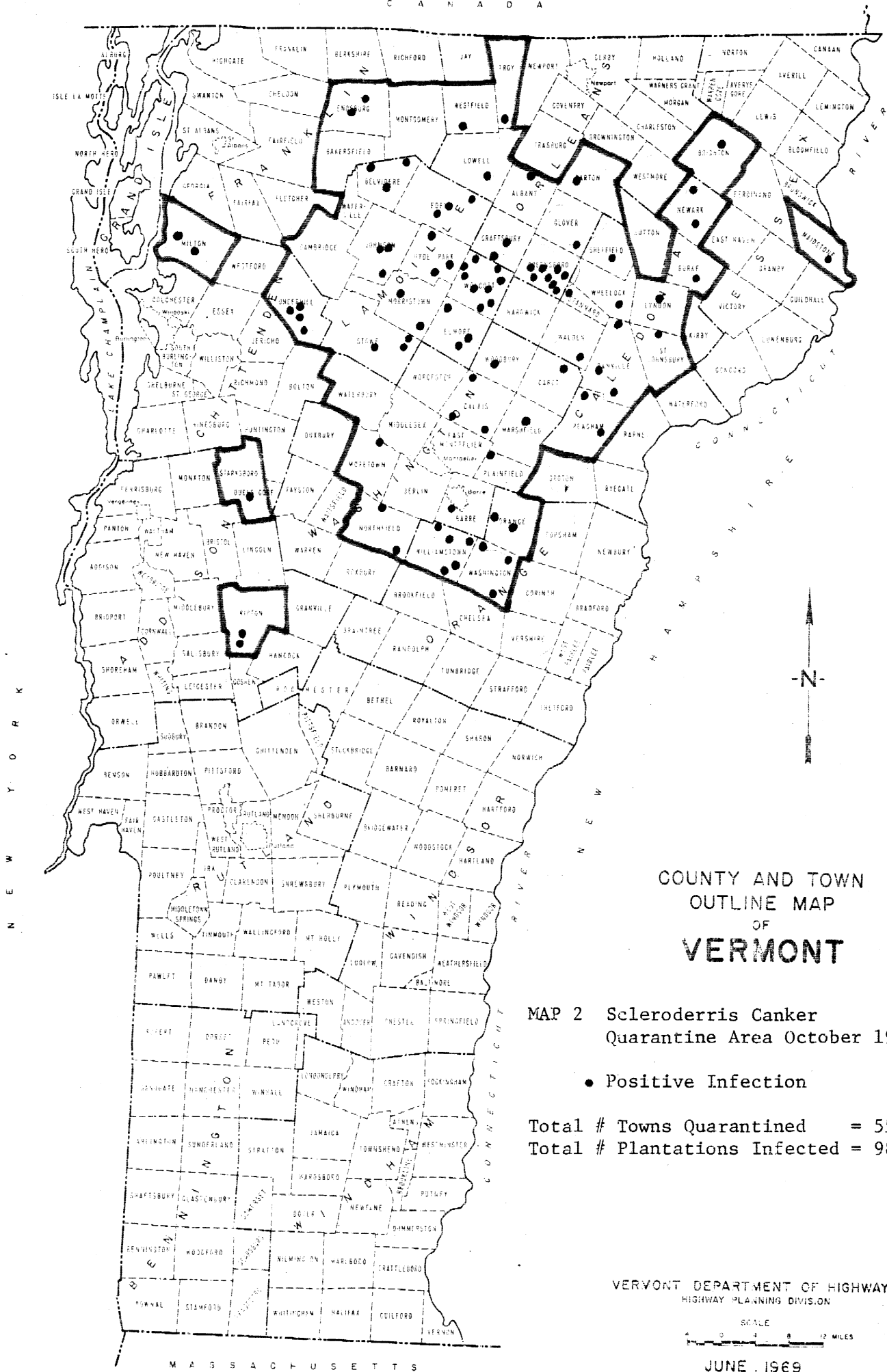
An intensive survey of all red and Scots pine in the towns of Troy, Westfield and Lowell was recently conducted. It is hoped that these towns can eventually be deregulated by silvicultural treatment of the known infected plantations (one per town), since only one additional plantation was found to be infected.

Newly infected branches remain about as prevalent as in 1982. The wet May this year probably promoted many new infections, but symptoms from the 1983 infection will not be fully evident until next spring. Total number of plantations known to be infected is now 98, consisting of 84 red pine plantations and 14 Scots pine plantations, representing 728 and 49 acres, respectively. Tree mortality remains limited to eight plantations comprising 40 acres.

Beech Bark Disease, caused by Cryptococcus fagisuga, and Nectria coccinea var. faginata, continues to cause mortality throughout, with chlorosis and dieback more noticeable than in previous years. Many of the areas with significant damage had been defoliated in previous years, or had suffered from wind storms or ice breakage. Dry conditions contributed to the poor health of affected trees. Beech scale populations remain at light but increasing levels as observed in 1982. Permanent plots were established in three locations to monitor changes in beech scale populations.

Cytospora Canker, caused by Cytospora kunzei, was responsible for mortality in two balsam fir Christmas tree plantations in Windsor County and one Douglas fir plantation in Bennington County. The balsam fir was on wetter than average sites, and damage was occurring to scattered individuals. The Douglas fir was, in general, improperly planted. The disease remains a common cause of branch mortality on blue and white spruce.

White Pine Blister Rust, caused by Cronartium ribicola, remains at fairly low infection rates in most locations but may be increasing. Young white pines in two Lamoille County locations were found to have small branch cankers resulting from infection in the fall of 1982. Increasing damage was also reported from Bennington County. Ribes control for the State nursery was completed this summer, using Roundup herbicide at the rate of 2 oz. per gallon of water. Over 400 plants were treated, with excellent results.



OTHER STEM DISEASES

<u>DISEASE</u>	<u>HOST(S)</u>	<u>LOCALITY</u>	<u>REMARKS</u>
Black Knot <u>Apiosporina morbosum</u>	Cherry	Widespread	
Dutch Elm Disease <u>Ceratocystis ulmi</u>	Elm	Widespread	Increased mortality in southern Vermont due to dry weather.
Fireblight <u>Erwinia amylovora</u>	Apple	Lamoille & Caledonia Cos.	Cause of dieback, and death of one tree.
Hypoxylon Canker <u>Hypoxylon pruinaum</u>	Aspen	Widespread	Case of stem breakage during summer windstorms
Verticillium Wilt <u>Verticillium albo-atrum</u>	Sugar Maple	St. Johnsbury	Caused death of an ornamental tree.

Foliage Diseases

Anthracnose, caused by Gloeosporium sp, was widespread, causing defoliation of maples, as well as ash and birch in small, isolated patches. Within patches, infection patterns were erratic. Cold, wet conditions in spring are thought to have led to a buildup of the disease. Often, the patches were near openings, which tend to hold condensation longer. Most of the patches were at mid to upper slope locations. The most severe damage occurred on shallow sites which were more susceptible to the summer's drought. Apparently, defoliation allowed the soil to dry out faster, leading to even more extensive browning. Some white ash refoliated. Damage occurred as well to ornamental maple, oak, ash in northern Vermont.

Fir-Fern Rust of balsam fir, caused principally by Uredinopsis mirabilis, caused widespread defoliation of balsam fir Christmas trees in northern Vermont (Figure 5). The cool, wet spring weather was undoubtedly responsible for the increased damage compared to only light damage in 1982. Most balsam fir plantations with any ferns present suffered some damage, and over 100 acres of moderate to heavy damage is known to have occurred. Several Christmas tree growers mowed their plantations to keep the alternate host fern plants down, while others expressed an interest in controlling the ferns, principally sensitive fern, with herbicide treatments.

Diebacks, Declines and Environmental Diseases

Larch Decline and mortality continues to be evident on approximately 5000 acres of larch stands, mostly in Washington and Caledonia counties, but has tapered off in most other locations. One exception is Essex County, where 684 acres were reported for the first time this year. Symptoms developed late this year, with chlorosis first appearing in late August. The total acreage known to be affected is approximately 9000 acres. The difference between this and the 5000 acres reflects the fact that the decline has already run its course in many stands. Heavy populations of eastern larch beetle continue to be associated with larch decline.

Ash Dieback appears to be increasing, at least in areas previously defoliated by forest tent caterpillar. White ashes within plots established in the Camel's Hump area in 1982 exhibited an increase in branch dieback in 1983. White ashes in Roxbury State Forest exhibited decline early this spring but much of this was attributed to frost damage. Core samples indicated slow growth over the past several years, however.

White Pine Needle Blight affected individual susceptible white pines throughout the region. The semi-mature tissue needle blight (SNB) phenomenon is characterized by browning of tips or entire needles of current growth throughout the trees, sometimes with only several needles affected per fascicle. Often, a severely affected tree would be adjacent to a healthy individual. Some pathologists believe that symptoms are produced by cloudy moist weather abruptly followed by continuous hot dry weather during needle elongation, fitting this year's weather pattern. Other investigators believe air pollution may contribute to the production of needle blight symptoms. The pattern of blight on some trees was characteristic of ozone damage, but it is not known whether this pollutant was a factor in causing some of the blight. Most affected trees are expected to green up normally next spring.

Birch Decline, especially of white birch, was evident on many mountain slopes, particularly on well-drained sites. Close examination revealed recent branch dieback, dried up leaves in mid-summer, and evidence of ambrosia beetle attacks. The latter is a sure sign that the trees are under stress.

Frost Damage was widespread following hard frosts the nights of May 17 and 18, with heaviest damage in low lying areas in Windsor County. On individual trees, damage was lightest on lower branches due to reradiation of heat from the earth at night. Damage was most severe in affected areas where trees were killed. Shoot damage was also heavy on ash, hickory, basswood, beech, alder and balsam fir. Shoots of black locust, sycamore, and catalpa had not yet developed when the frost occurred. These species remained bare until mid-June. Lateral buds on other species began developing in the first week of June, and crowns of most trees appeared normal within several weeks, although dead twigs could be seen in the crowns of some individuals. Light damage to balsam fir shoots was widespread in northern Vermont.

Wind Damage caused by tornado-force winds knocked over numerous trees in Colchester and Essex (Chittenden County) in early August. High winds also caused widespread shredding of leaves and branch damage in Orleans and Caledonia counties. Wind damage to ornamentals is often linked to improper care when the trees were planted, resulting in poor branch unions and interior decay.

Ornamental Oaks in Caledonia County urban areas exhibited small, sparse leaves, particularly in the upper canopy. This is probably just one more indicator of the weather-related stress that occurred this year.

ANIMAL DAMAGE

<u>ANIMAL</u>	<u>SPECIES DAMAGED</u>	<u>LOCALITY</u>	<u>REMARKS</u>
Deer	Christmas trees	Pownal	Damage eliminated by cutting adjacent hedgerows, reducing screening and security for browsing deer.
Mouse			Not observed.
Porcupine		Widespread	Isolated problem areas; damage increasing in Northeast Kingdom.
Red Squirrel	Maple Tubing	Northern Vermont	Light to Moderate, increasing in some counties.